

Fishery Management Report No. 10-11

**Kodiak Management Area Herring Fisheries Annual
Management Report, 2008**

by

Geoff Spalinger

March 2010

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid eye to fork	MEF
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	mid eye to tail fork	METF
hectare	ha	at	@	standard length	SL
kilogram	kg	compass directions:		total length	TL
kilometer	km	east	E		
liter	L	north	N	Mathematics, statistics	
meter	m	south	S	<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	west	W	alternate hypothesis	H _A
millimeter	mm	copyright	©	base of natural logarithm	e
		corporate suffixes:		catch per unit effort	CPUE
Weights and measures (English)		Company	Co.	coefficient of variation	CV
cubic feet per second	ft ³ /s	Corporation	Corp.	common test statistics	(F, t, χ^2 , etc.)
foot	ft	Incorporated	Inc.	confidence interval	CI
gallon	gal	Limited	Ltd.	correlation coefficient (multiple)	R
inch	in	District of Columbia	D.C.	correlation coefficient (simple)	r
mile	mi	et alii (and others)	et al.	covariance	cov
nautical mile	nmi	et cetera (and so forth)	etc.	degree (angular)	°
ounce	oz	exempli gratia	e.g.	degrees of freedom	df
pound	lb	(for example)		expected value	E
quart	qt	Federal Information Code	FIC	greater than	>
yard	yd	id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
Time and temperature		monetary symbols	\$, ¢	less than	<
day	d	(U.S.)		less than or equal to	≤
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (natural)	ln
degrees Fahrenheit	°F	registered trademark	®	logarithm (base 10)	log
degrees kelvin	K	trademark	™	logarithm (specify base)	log ₂ , etc.
hour	h	United States (adjective)	U.S.	minute (angular)	'
hour	h	United States of America (noun)	USA	not significant	NS
minute	min	U.S.C.	United States Code	null hypothesis	H ₀
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	percent	%
				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			variance	
hertz	Hz			population	Var
horsepower	hp			sample	var
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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ANNUAL MANAGEMENT REPORT, 2008**

by
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ABSTRACT

This report presents information concerning the commercial Pacific herring *Clupea Pallasii* sac roe, food and bait, and subsistence fisheries that occurred in the Kodiak Management Area (KMA) in 2008.

The KMA 2008 herring sac roe fishery was open from April 15 through June 30. Fishermen harvested 3,099 tons, compared to the preseason guideline harvest level (GHL) of 4,290 tons. The herring sac roe fishery is managed under an allocative harvest strategy that provides approximately 75% of the total Kodiak GHL to seine gear and approximately 25% to gillnet gear. Purse seine fishermen harvested 3,086 tons, over 99% of the total catch (96% of their allocation) and gillnet fishermen harvested 13 tons, less than 1% of the total catch (1% of their allocation). Roe recovery percentages averaged 10.3% for the fishery. The total exvessel value of the fishery was an estimated \$1,626,975. Herring abundance in the KMA has been increasing in recent years and recruitment was strong in several sections during 2008. The commercial catch was composed primarily of 25.2% age-3, 30.3% age-4, 17.5% age-5, 6.6% age-6, 8.2% age-7, 4.9% age-8, 3.8% age-9, 1.6% age-10, and 1.2% age-11 herring.

A combine fishery was conducted for the KMA herring food and bait fishery for the 2001 to 2008 seasons due to the small GHLs. Two trips were made to the Uganik District in 2008 harvesting 202 tons (179 ton GHL). The Eastside District (93 ton GHL), the Uyak District (27 ton GHL), and the Alitak District (52 ton GHL) could have been opened in 2008; however, no requests were made to the Alaska Department of Fish and Game to open these districts.

Subsistence herring harvests were reported from a total of 21 subsistence permits through June 19, 2008. The total subsistence herring harvest for the KMA in 2008 was 4,024 pounds.

Key words: Kodiak, Herring, *Clupea pallasii*, sac roe commercial fishery, food and bait commercial fishery, subsistence fishery, stock status, GHL, KMA, AMR.

INTRODUCTION

This report presents information on the commercial Pacific herring *Clupea Pallasii* sac roe food and bait and subsistence fisheries that occurred in the Kodiak Management Area (KMA) in 2008. This includes harvest data by fishery, age and weight data collected from the commercial harvest, stock status, and a summary of fishery management activity.

The KMA comprises the waters of the Kodiak Archipelago and that portion of the Alaska Peninsula extending from Cape Douglas southwest to Kilokak Rocks (Figure 1). The archipelago is approximately 250 kilometers (150 miles) long, extending from Shuyak Island in the North, south to the Trinity Islands. The Alaska Peninsula portion of the KMA is about 267 kilometers (160 miles) long and is separated from the archipelago by Shelikof Strait (Figure 1).

The KMA is divided into 13 districts which define geographical areas used to manage both the herring sac roe and the food and bait fisheries (Figure 2). For the sac roe fishery, each district is divided into sections that define the spawning area used by specific herring stocks or a geographical area.

HERRING SAC ROE FISHERY

FISHERY CHARACTERISTICS

The KMA herring sac roe fishery began in 1964 (Table 1; Figure 3) and occurs in approximately 30 bays and coastal locations. The fishery currently opens at noon on April 15, with most of the management area opening concurrently. The concurrent opening of sections on April 15, prior to any major buildup of herring, was historically intended to distribute effort and harvest; however, in recent years purse seine fishermen have concentrated in areas known to have early spawning

herring and the largest guideline harvest levels (GHLs). The fishery ends on June 30 (5 AAC 27.510(a)).

Gear

Purse seines and gillnets are the only gear types allowed in the commercial sac roe fishery. Purse seines may not exceed 18 fathoms stretch measure in depth or 100 fathoms in length (5 AAC 27.525(a)). Gillnets may not exceed an aggregate length of 150 fathoms (5 AAC 27.520(a)).

Fishing Periods

From April 15 through May 7, fishing periods for purse seiners are from noon until 9:00 PM on odd-numbered days and from 9:00 AM to noon on even-numbered days. From May 8 through June 30 fishing periods for purse seiners are from noon until 10:00 PM on odd-numbered days and from 9:00 AM to noon on even-numbered days (5 AAC 27.510(a)(1)). For gillnets, fishing periods are from noon on odd-numbered days until noon on even-numbered days (5 AAC 27.510(a)(2)).

Harvest Strategy

The herring sac roe fishery is managed under an allocative harvest strategy that has been in effect since 2000. The harvest strategy requires the Alaska Department of Fish and Game (ADF&G) to establish GHLs by section, based on historical harvest data, current and past fishery performance, commercial catch samples, and aerial biomass surveys. For each district that has more than one section open to fishing, ADF&G is required to assign 20% to 30% of the GHL to gillnet permit holders and 70% to 80% of the GHL to purse seine permit holders (5 AAC 27.535(e)(2)(D)). This is accomplished by designating one gear type for each section with a GHL. In districts where assigning one gear type for each section would not achieve the required allocation, ADF&G establishes GHLs for both gear types, within a section, and fishing is separated by time or area. ADF&G may also use emergency order (EO) authority to restrict fishing time and open areas in any section if concerns about overharvest arise during the season.

In January 2008, the Alaska Board of Fisheries (BOF) met in Kodiak and changed a few fishery regulations. The biggest change allowed ADF&G, based on their assessment of harvest or effort, to allow one gear type to operate in an area during any open period without regard to the allocation (5 AAC 27.535(e)(1)(C)). Also, registration requirements were changed so that permit holders wishing to participate in the fishery must register between April 1 and April 14 (5 AAC 27.510(a)(4)). Finally, new section lines for the Alitak District were placed into regulation (5 AAC 27.505(g)).

FISHERY MANAGEMENT

Establishing GHLs

Preseason GHLs are established for all sections that have produced consistent herring harvests in previous seasons. These GHLs reflect the status of a particular herring stock by section. In 2008, section GHLs ranged from 10 to 1,700 tons (Table 2). Establishing the 2008 GHLs involved evaluation of a variety of information to determine stock status trends and conservative adjustment of GHLs, including

- 1) fishery performance during preceding season or seasons (i.e., harvest timing, harvest duration, average school size);

- 2) trends in age composition (i.e., level of recruitment of age-3 herring, the proportion of age-5 and younger herring, and the proportion of age-2 herring as an indicator of future recruit strength);
- 3) observations of spawn and juvenile herring;
- 4) industry and department aerial surveys;
- 5) hydroacoustic surveys;
- 6) test fishery data including age composition and biomass estimates; and
- 7) aged-structured analysis (ASA) modeling.

Preseason GHs have generally reflected the actual harvests and have aided fishermen and processors in planning prior to the start of each season.

ADF&G has historically relied on the fishing industry to establish roe recovery and minimum size standards. The quality of Kodiak herring has generally been high, due to selective harvest of mature herring by fishermen and the inseason processing of relatively small amounts of herring over long time periods by local processors. In the 1990s, competition in the purse seine fishery intensified and fishermen were less selective in harvesting high quality herring. In 2003 and 2004 ADF&G took a more active role in some sections to manage for roe quality, which resulted in delayed openings of sections and an increase in roe quality. During the 2005 BOF meeting, the harvest strategy was changed so that ADF&G is now directed to strive for the highest level of product quality (5 AAC 27.535(e)(6)).

Inseason Fishery Management

Inseason, processors and independent tender operators are required to provide daily tallies of herring tonnage and deliveries by section, as well as accurate estimates of herring tonnage onboard tenders that have not yet delivered to the processor. Reports from field personnel, processors, permit holders, spotter pilots, and tenders are tallied by ADF&G to assess herring harvests. Generally, once the harvest estimate meets or approaches the GH, a section is closed for the season by EO. Due to the rapid pace at which some harvests occur, inperiod closures are frequent. In sections that have field personnel present on the grounds, inperiod closures may occur with only a few minutes of advance notice. To date, industry cooperation has greatly aided managers.

2008 SEASON SUMMARY

The 2008 sac roe season opened at noon April 15 and 25 emergency orders concerning this fishery were issued during the season (Appendix A1.). The last harvest occurred on May 26 (Figure 4). The total 2008 KMA GH was initially established at 3,890 tons, but raised to 4,290 tons inseason (Tables 2 and 3; Spalinger and Wadle 2008). A total of 3,099 tons were harvested (Table 3; Figure 5).

In 2008, 22 purse seine permit holders harvested 3,086 tons of herring in 108 deliveries (Table 3; Figure 6). Gillnet permit holders harvested 13 tons (Table 3; Figure 6). Purse seine fishermen harvested over 99% (96% of their allocation) and gillnet fishermen harvested less than 1% (1% of their allocation) of the total KMA harvest in 2008 (Table 3; Figure 7). The 2008 average individual purse seine permit holder harvest was 140 tons, the highest average harvest for the

years 1979 through 2008 (Table 3). Six companies operated seven shore-based processing facilities that were registered to buy and process herring.

ADF&G monitored the fishery with two shore-based field crews and two department vessels, all of which were stationed in anticipated herring harvest locations. Crews gathered effort and harvest data used to manage the fishery, and collected commercial catch samples to obtain age, weight, and length (AWL) data.

A total of 43 sections were open to fishing; however, 14 of these sections were exploratory, having little or no historic harvest (Table 2). Harvests only occurred in 12 sections. The remaining sections were either not fished or no harvest occurred.

Purse Seine Fishery

Purse seine harvests in 2008 were in similar areas as previous years. The largest harvest was in the Village Islands/Uganik Bay sections of the Uganik District, where 1,629 tons were harvested out of a GHL of 1,350 tons for purse seine gear (Table 2). A total of 245 tons were harvested from four sections in the Eastside District where the combined GHLS were 700 tons (Table 2). The combined Inner and Outer Deadman Bay, The East Upper Olga Bay, and West Upper Olga Bay sections in the Alitak District had a harvest of 342 tons where the combined GHLS were 400 tons (Table 2). Purse seiners harvested 433 tons, out of a total GHL of 450 tons, from the Danger Bay Section in the South Afognak District (Table 2). The Inner Uyak Bay Section of the Uyak District had a harvest of 353 tons from a 200 ton GHL (Table 2). Roe recovery from purse seine harvests averaged 10.3% (Figure 8).

Gillnet Fishery

Gillnet effort was expected to be minimal in 2008. As a result, ADF&G opened gillnet only areas by EO to continuous fishing beginning at noon on April 15. Normally gillnet areas follow a fishing schedule that allows them to fish from noon on even-numbered days until noon on odd-numbered days (24-hour open periods followed by 24-hour closed periods).

Gillnet permit holders harvested 13 tons from the 350 ton GHL in the Village Islands/Uganik Bay sections (Table 2).

Gear Changes

On May 10, ADF&G allowed purse seiners to harvest herring in the Sulua Bay and Lower Olga Bay sections of the Alitak District. These sections had been previously open to gillnet gear for continuous fishing by EO, but no harvest or effort had occurred. Purse seine fishing periods began at 9:00 AM May 10 and followed the established fishing periods in regulation (5 AAC 27.510(a)(1)). Gillnet fishing periods were established to be 24-hours in length from noon on even-numbered days to noon on odd-numbered days followed by a 24-hour closed period. Despite opening these areas to both gear types, no harvest occurred.

Exvessel Value of the Fishery

In 2008, the exvessel price paid for 10% roe recovery herring was approximately \$525 per ton at the dock, an increase from the \$400 per ton paid in 2007 (Table 3). The estimated average exvessel earnings for purse seine permit holders was \$73,643 (Table 3; Figure 9). The total exvessel value of the 2008 fishery was an estimated \$1,626,975 (Table 3; Figure 10), which does not include any adjustments in value for roe recovery above or below 10% recovery, herring that

are sold as bait, or herring that were discarded. Roe recovery from the 2008 fishery averaged 10.3% (Figure 8).

STOCK ASSESSMENT

ADF&G evaluates fishery performance and survey information to assess trends in stock status. Hydroacoustic and aerial surveys are conducted by ADF&G to assess herring abundance prior to, during, and after the commercial fishery and to survey closed sections. Herring samples come from commercial harvests and from research vessels (using trawl gear). Age composition information from these samples provides insight into recruitment trends and GHJL adjustments. For example, areas with strong percentages of age-4 and younger herring (recruitment) will not be aggressively fished and will have conservative GHJLs, whereas areas with older age classes (9 or more years old) will be more aggressively fished with increased GHJLs.

Industry aerial observers and permit holders have aided managers by providing biomass estimates, spawn observations, fleet movements, and harvest estimates. Although aerial and hydroacoustic assessments provide an evaluation of the biomass, there are problems associated with herring assessment in the KMA. These problems include the following:

- 1) Herring tend to be deeper during the day and rise toward the surface during the evening and early morning hours, limiting the time fish are observable from the air.
- 2) Most fishing sections have several distinct schools of herring that spawn from April through June, making complete biomass estimates difficult.
- 3) Herring may stay within an area for the duration of the sac roe season or may move to another district, which may lead to duplicate or incomplete biomass estimates, or incorrect assignment to a spawning stock location.
- 4) The KMA encompasses a large geographical area.
- 5) Adverse weather conditions limit the extent of surveys.
- 6) Hydroacoustic surveys are limited in shallower waters, and the extent of herring avoidance to vessel noise is unknown.
- 7) A substantial amount of subtidal spawning may occur in water 10 to 20 fathoms in depth, which is not detectable from aerial surveys.

Fishery performance is used to evaluate stock status; however, due to the low gillnet effort since 1998, fishery performance may not be an indicator of stock status within the gillnet sections. In 2008, no commercial catch samples were collected from gillnet sections. Participation in most purse seine sections has been consistent and commercial catch samples have been taken regularly.

Catch Sampling

A total of 6,101 herring were collected for AWL data from harvests, test sets, and ADF&G trawl samples during the 2008 sac roe season. Samples were taken from 11 sections, nine of which had commercial harvests. Age-3, -4, and -5 herring were the dominant age classes harvested in 2008, representing over 70% of the total commercial harvest (Table 4). The complete commercial harvest consisted of 0.1% age-2, 25.2% age-3, 30.3% age-4, 17.5% age-5, 6.6% age-6, 8.2% age-7, 4.9% age-8, 3.8% age-9, 1.6% age-10, 1.2% age-11, and 0.2% age-13 and older herring (Table 4). No herring were collected from gillnet harvests. Generally, herring from the Inner and

Outer Deadman Bay and West Upper Olga Bay sections of the Alitak District were larger at age than those found throughout the remaining Kodiak Archipelago (Table 5).

Stock Status by District

Herring can generally be found seasonally in all bays of the KMA (Figure 2). ADF&G monitors approximately 70 sections that are known to have spawning populations of herring, with priority effort spent on larger herring stocks. Generally, there is less information available for the smaller stocks of herring so the evaluation of these stocks is more tenuous. In some areas, such as the Mainland District, several years may elapse before new information becomes available. The department also considers information provided by commercial herring fishermen, spotter pilots, air taxi operators, and remote area residents concerning herring distribution, biomass estimates, and spawn sightings.

North Afognak District

Five sections compose the North Afognak District. Spawning stocks of herring occur in all five sections, although these stocks tend to be small (less than 20 tons; Figure 2). The Tonki Bay Section currently has the largest biomass, and had a 20 ton GHL established in 2008. Purse seine fishermen harvested 21 tons (Table 2). Commercial catch samples showed the harvest consisted primarily of 22.5% age-3, 39.0% age-4, 27.8% age-5, 6.4% age-6, 2.8% age-7, and 1.3% age-8 herring (Table 4). Department hydroacoustic surveys estimated nearly 200 tons in Tonki Bay.

West Afognak District

The West Afognak District has six sections, five of which are known to have spawning stocks of herring (Figure 2). Paramanof Bay has the largest spawning stock within this district; however, this stock has been at low levels since 2005. In 2008, the R/V Resolution conducted hydroacoustic surveys in mid April. The results were encouraging and the observed biomass was estimated to be greater than 4,500 tons. Department staff were able to trawl and collect samples that consisted of younger fish. The sample was made up of 0.4% age-2, 59.6% age-3, 34.0% age-4, and 5.9% age-5 (Table 4). Stocks in the West Afognak District appear to be rebounding from recent low levels.

South Afognak District

The South Afognak District comprises six sections and the Danger Bay Section currently has the largest stock of herring in this district (Figure 2). In 2008, a 200-ton GHL was initially established for this section; however, hydroacoustic surveys estimated approximately 8,000 tons prior to the season. The GHL was increased to 600 tons and allocated between the two gear types. Purse seine permit holders harvested at total of 433 tons (Table 2). Commercial catch samples showed the harvest consisted of 16.3% age-3, 33.4% age-4, 21.0% age-5, 6.5 % age-6, 9.6% age-7, 6.1% age-8, 4.1% age-9, and 1.6% age-10 (Table 4).

In 2008, the MacDonald Lagoon, Kitoi Bay, and Izhut Bay sections were combined and managed as one purse seine section with a 40 ton GHL (Table 2). However, no purse seine permit holders harvested herring.

Uganik District

The Uganik District consists of nine sections on the northwest side of Kodiak Island (Figure 2). During the last 10 years this district has been the most productive in the KMA, and hydroacoustic and aerial survey information indicate that the Village Islands spawning biomass

is currently the largest in the KMA. The total biomass of herring observed in the Village Islands/Uganik Bay sections has been estimated from 10,000 to 30,000 tons (herring congregate in Uganik Bay throughout the year, complicating biomass estimation). The 2008 GHL for this section was 1,700 tons for all gears combined and 1,629 tons were harvested by purse seine gear and 13 tons by gillnet gear (Table 2). Age composition data from the 2008 Village Islands/Uganik Bay sections commercial sac roe purse seine fishery indicate excellent recruitment. The fishery was composed mainly of 20.2% age-3, 31.8% age-4, 20.8% age-5, 7.1% age-6, 4.6% age-7, 5.8% age-8, 5.1% age-9, 2.1% age-10, and 1.7% age-11 (Table 4). Stocks in the Uganik District are at historic high levels.

Uyak District

Through the 1980s, the Uyak District was the largest herring producing district in the KMA (Figure 2). In the early 1990s these stocks began declining and were at low levels for several years. In 2002, aerial surveys indicated that these stocks were improving, and by 2004 several sections were reopened for the first time since 1994. The 2008 GHL for the Inner Uyak Bay Section was 200 tons and 353 tons were harvested by purse seiners (Table 2). The fishery was composed primarily of younger fish with 39.8% age-3, 31.3% age-4, 14.0% age-5, 5.6% age-6, 4.4% age-7, 2.2% age-8, and 1.2% age-9 (Table 4). ADF&G hydroacoustic surveys indicated over 2,000 tons in this section during 2008.

The Brown's Lagoon Section was open to gillnet gear in 2008 with a 30 ton GHL (Table 2). No effort was made in this section; however, the R/V Resolution was able to conduct hydroacoustic surveys. Approximately 1,400 tons of herring were estimated in the section during 2008. It is likely this stock moves between the Brown's Lagoon and Inner Uyak sections.

Alitak District

All sections in the Alitak District (Figure 2), except the Outer Alitak Section, are known to have herring stocks. Herring stocks began to decline in the Alitak District in the early 1990's, and by 1998 most sections were closed. In 2002, aerial survey reports indicated an increase in herring abundance. In 2003 and 2004 some sections were opened to gillnet gear to act as test fisheries. By 2005, several sections that had been closed were reopened.

In 2008, the Inner and Outer Deadman Bay sections were combined and managed together as one unit. The GHL was established at 200 tons and 207 tons were harvested (Table 2). The harvest was represented by mainly 26.9% age-3, 28.0% age-4, 7.9% age-5, 6.3% age-6, 27.7% age-7, and 2.4% age-8 (Table 4). ADF&G hydroacoustic surveys estimated over 3,000 tons in these sections.

The East Upper Olga Bay Section was open in 2008 with a 50 ton GHL and 90 tons were harvested (Table 2). The West Upper Olga Bay Section was open in 2008 with a 50 ton GHL and 45 tons were harvested. Herring sampled from the harvest were composed mostly of 6.8% age-3, 19.5% age-4, 5.3% age-5, 9.6% age-6, 47.5% age-7, 5.9% age-8, 2.2% age-9, 1.2% age-10, and 1.6% age-11 (Table 4). ADF&G aerial surveys estimated approximately 420 tons between these two sections.

Eastside District

The Eastside District is composed of four bay complexes: Ugak Bay, Kiliuda Bay, East Sitkalidak Strait, and West Sitkalidak Strait (Figure 2). Sixteen sections have been established and only one, the Outer Sitkalidak Section, has no history of herring sac roe harvests. Due to the

reduced gillnet fleet and low herring prices, the smaller and more distant gillnet sections of this district have not been fished in recent years. Hydroacoustic surveys in this district are less frequent than other portions of the KMA.

Generally, the East and West Sitkalidak sections have the earliest spawning herring in the KMA, with initial spawns occurring in late March. In 2008, the GHF for the East Sitkalidak Section was established at 150 tons, with 91 tons harvested by purse seine gear (Table 2). Age compositions of the harvest were composed mainly of younger fish with 71.8% age-3, 20.1% age-4, 1.4% age-5, 1.5% age-6, and 4.2% age-7.

The West Sitkalidak Section GHF was established at 125 tons in 2008 and only 17 tons were harvested (Table 2). Fishermen had trouble finding marketable herring in this section.

The Barling Bay Section, adjacent to the West Sitkalidak Section, has been the most consistent herring producer in the Eastside District. The section had a 75 ton GHF in 2008 and 108 tons were harvested (Table 2). Commercial catch samples of the harvest were composed of mostly younger fish with 67.2% age-3, 16.9% age-4, 3.0% age-5, 1.8% age-6, 7.0% age-7, and 1.2% age-8 herring (Table 4). ADF&G hydroacoustic surveys of this section estimated approximately 1,000 tons.

The Inner and Outer Kiliuda Bay sections have been consistently strong herring producers in the past. However, fishermen have had trouble finding marketable herring in recent years. In 2008, the GHF for the Outer Kiliuda Bay Section was set at 100 tons (Table 2). Fishermen again had trouble locating marketable herring and only harvested 29 tons (Table 2). No commercial catch samples were obtained from the Kiliuda Bay sections in 2008. In 2008, the GHF for the Inner Kiliuda Bay Section was set at 40 tons and no fish were harvested by gillnet vessels (Table 2).

The Inner and Outer Ugak Bay sections have been strong herring producers in the past. The 2008 GHF for the Outer Ugak Bay Section was 250 tons and allocated to purse seiners (Table 2). Despite large numbers of herring present on the grounds no marketable fish were caught.

Northeast District

The Northeast District is composed of five sections, four of which have known spawning stocks of herring (Figure 2). The Women's Bay Section currently has the largest stock of herring in this district. No harvest occurred in this section during 2008; however, department hydroacoustic surveys estimated 50 tons in the Women's Bay Section. Hydroacoustic surveys also estimated approximately 30 tons in the Middle Bay Section.

Inner Marmot District

There are five sections within the Inner Marmot District, all have known spawning stocks of herring, although most stocks are small (Figure 2). The Kizhuyak Bay Section has the largest stock of herring in the district. In 2008, this section was opened to purse seine gear with a 60-ton GHF and 63 tons were harvested (Table 2). Samples from the harvest were composed of 4.4% age-3, 16.7% age-4, 11.6% age-5, 16.2% age-6, 32.6% age-7, 9.7% age-8, 6.1% age-9, and 2.2% age-10 (Table 4). Department hydroacoustic surveys of the Kizhuyak Bay Section indicated a biomass of over 1,000 tons.

Mainland District

There are three Mainland districts comprising 12 sections (Figure 2). The last commercial herring harvest from the Mainland Districts occurred in 1997. Seven sections were open as exploratory in 2008; however, only one was fished and no marketable herring were found.

HERRING FOOD AND BAIT FISHERY

FISHERY CHARACTERISTICS

Harvest Strategy

The herring food and bait season currently opens September 1 and lasts until February 28 (5 AAC 27.510(b)). GHs for the fishery are established by district and are based upon 10% of the GHs established for the preceding sac roe fishery by section (5 AAC 27.535(b)).

Combine Fisheries

The KMA herring food and bait fishery was closed for the 1999 and 2000 seasons because of low potential GHs and ADF&G's concern for manageability of a competitive fishery on a highly aggregated stock. In 2001, the Commercial Fisheries Entry Commission (CFEC) designated the KMA herring food and bait fishery a limited entry fishery and issued 13 interim use permits to those fishermen who made landings between 1994 and 1998 (Gretsch 2001). Because of the relatively low GHs available (60 tons in the Uganik District and 47 tons in the Eastside District), ADF&G did not allow a competitive fishery in 2001. As an alternative, the interim permit holders formed a combine and the department and CFEC agreed to allow a combine fishery to occur. The 13 interim permit holders determined which vessel would conduct the harvest, all marketing aspects, and all costs associated with harvesting and tendering the herring. In July 2002, the CFEC made a final determination on these limited entry permits. Nine permanent limited entry permits were issued, consisting of five purse seine/gillnet permits and four trawl permits.

Combine fisheries have been conducted under similar conditions each season from 2002 through 2008. Generally, one purse seine vessel is used in conjunction with a tender to catch the herring. Fishing efforts have targeted the two larger GH areas, the Uganik and Eastside districts, whereas the two areas with smaller GHs, the Alitak and Uyak districts, have remained unfished. Trawl permit holders have not participated in the harvesting for the combine fishery.

Kamishak Stock

During the fall and winter months of the early 1980s, large concentrations of herring were observed in eastern Shelikof Strait and adjacent bays along the west side of the Kodiak Archipelago. The biomass exceeded that of known KMA spawning stocks. Herring food and bait fishermen targeted these herring, but the stock composition was unknown. In 1986, a stock identification study, based on scale pattern analysis, was conducted on herring harvested from a large biomass located in the northeastern part of the Shelikof Strait (Johnson et al., *Unpublished*, Stock Identification of Pacific Herring in the Bait Fishery in Shelikof Strait, Alaska, 1985/86, available through Geoff Spalinger, ADF&G fishery management biologist, Kodiak, Alaska). Results of the study indicated that at least 80% of the Shelikof herring catch sampled were Kamishak Bay stocks, which spawn within the Lower Cook Inlet (LCI) Management Area. The current harvest strategy alleviates the problem of identifying the spawning stock of a harvest in

areas where intermixing may occur by closing the food and bait fishery north of the latitude of Miners Point (Uganik Bay) when the Kamishak spawning biomass falls below 6,000 tons (5 AAC 27.535(d)).

KAMISHAK FISHERY CLOSURE

The 2009 biomass forecast for Kamishak Bay herring affects the 2008/2009 Kodiak food and bait fishery in the Shelikof Strait. The biomass forecast for Kamishak Bay herring for the 2009 season was estimated at just over 2,000 tons, well below the minimum spawning biomass of 6,000 tons that must be met before commercial fisheries may occur in Kamishak Bay (5 AAC 27.465(e)(4); Ted Otis, Lower Cook Inlet Finfish Research Biologist, ADF&G, Homer, Alaska, *Personal Communication*). Due to the low biomass forecast for 2009, the Kamishak Bay sac roe fishery will be closed for the 2009 season and the Shelikof Strait food and bait fishery north of the latitude of Miner's Point was closed for the 2008/2009 season. Because of insufficient biomass, the Kamishak Bay District sac roe fishery has been closed since 2000 (Otis and Cope 2004).

2008/2009 SEASON

Permit holders again requested a combine fishery for the 2008/2009 season, although there was some discussion of having a competitive fishery. The biggest obstacle to a competitive fishery is how to determine equitable fishing periods for the two gear types. ADF&G accommodated the permit holders request and that portion of the Uganik District south of Miners Point was opened on September 19 with a 179 ton GH (Table 6). Other areas that could have opened by EO included the Eastside District (93 ton GH), the Uyak District (27 ton GH), and the Alitak District (52 ton GH; Table 6). Approximately 80 tons were harvested on September 20 and 122 tons on October 16, for a total cumulative harvest of 202 tons (Table 7). The Uganik District was closed on October 20. This harvest fulfilled market demand in Kodiak and there were no other requests to open other areas.

CATCH SAMPLING

A total of 80 herring were collected for AWL analysis from the purse seine harvest in the Uganik District. Age compositions from the sample were 2.2 % age-4, 13.3 % age-5, 13.3% age-6, 31.1 % age-7, 8.8% age-8, 15.5 % age-9, 11.1% age-10, 2.2% and age-11.

HERRING SUBSISTENCE FISHERY

FISHERY CHARACTERISTICS

Prior to 1999, the herring subsistence fishery was referred to as a Personal Use/Subsistence Fishery and had occurred for at least twenty years. The majority of the harvest occurred near the Port of Kodiak in Womens Bay and was caught by gillnets. The herring were used primarily for bait in commercial longline and pot fisheries. Also, prior to 1999, this fishery was only regulated during the herring sac roe season, from April 15 to June 30, under the conditions of the subsistence permit issued in Kodiak. Gear was limited to a 25 fathom gillnet but there was no harvest limit. The remainder of the year there were no permit requirements, gear restrictions, or harvest limits.

In 1999, more restrictive regulations were approved by the BOF. These regulations allowed for a harvest of up to 500 pounds of herring with no permit requirements, except during the sac roe

fishing season (April 15 to June 30; Gretsches 2001). A subsistence permit was required for those individuals that wished to fish during the sac roe season or intended to harvest more than 500 pounds of herring annually. The maximum annual harvest was limited to 2,000 pounds per permit.

In 2000, herring subsistence harvests escalated due to bait needs created with the reopening of the commercial tanner crab fishery in the KMA. The department was concerned about the increased herring subsistence harvest and the appropriateness of taking subsistence herring for use as bait in a commercial fishery. ADF&G proposed regulation changes to the BOF in 2001, which were approved to allow for both types of historic harvests. The current subsistence regulation allows for the harvest of up to a total of 500 pounds of herring annually and requires that fishermen obtain a permit prior to fishing (5 AAC 01.530. (d)). Herring were included on the existing KMA salmon and crab subsistence permit. A new permit was also created which allows for the harvest of up to 500 pounds of herring by commercial permit holders to be used as bait in commercial fisheries (5 AAC 27.545).

2008 SEASON SUMMARY

Through June 19, 2008, approximately 80% of the KMA subsistence permits were returned to the department as required for reporting purposes with subsistence harvest information from 2008. The reported subsistence herring harvests totaled 4,024 pounds (Table 8). A total of 21 KMA subsistence permits were returned with herring harvest data, with most of the harvest coming from the Northeast, Inner Marmot, Uyak, and Eastside districts. No commercial permit holders harvested herring to be used as bait in commercial fisheries during 2008. One permit holder harvested 115 pounds of spawn on kelp from the Afognak District.

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- Otis, E. O., and J. L. Cope. 2004. Abundance, age, sex, and size statistics for Pacific herring in Lower Cook Inlet, 2000-2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A04-04, Anchorage.
- Spalinger G., and J. Wadle. 2008. Kodiak Management area herring sac roe fishery harvest strategy for the 2008 season. Alaska Department of Fish and Game, Fishery Management Report No. 08-18, Anchorage.

TABLES AND FIGURES

Table 1.--Annual harvests by weight and percent in the KMA commercial herring sac roe and food and bait fisheries, from 1964 through 2008.

Year	Sac Roe Harvest (Tons)	Food/Bait Harvest (Tons)	Total Herring Harvest (Tons)	Sac Roe Fishery Percent of Total Harvest (%)	Food/Bait Fishery Percent of Total Harvest (%)
1964	568	310	878	65%	35%
1965	657	35	692	95%	5%
1966	2,769	198	2,967	93%	7%
1967	1,662	300	1,962	85%	15%
1968	2,001	15	2,016	99%	1%
1969	1,130	11	1,141	99%	1%
1970	342	8	350	98%	2%
1971	284	44	328	87%	13%
1972	215	50	265	81%	19%
1973	831	178	1,009	82%	18%
1974	868	40	908	96%	4%
1975	8	5	13	62%	38%
1976	5	0	5	100%	0%
1977	338	0	338	100%	0%
1978	904	399	1,303	69%	31%
1979	1,735	125	1,860	93%	7%
1980	2,383	381	2,764	86%	14%
1981	2,065	18	2,083	99%	1%
1982	1,771	326	2,097	84%	16%
1983	2,318	33	2,351	99%	1%
1984	2,163	123	2,286	95%	5%
1985	1,968	102	2,070	95%	5%
1986	1,558	213	1,771	88%	12%
1987	2,146	217	2,363	91%	9%
1988	2,171	340	2,511	86%	14%
1989	2,249	345	2,594	87%	13%
1990	2,347	313	2,660	88%	12%
1991	2,432	215	2,647	92%	8%
1992	4,283	312	4,595	93%	7%
1993	4,929	837	5,766	85%	15%
1994	5,893	677	6,570	90%	10%
1995	4,604	507	5,111	90%	10%
1996	3,386	651	4,037	84%	16%
1997	3,235	756	3,991	81%	19%
1998	2,057	151	2,208	93%	7%
1999	1,651	0	1,651	100%	0%
2000	1,370	0	1,370	100%	0%
2001	1,694	115	1,809	94%	6%
2002	1,677	135	1,812	93%	7%
2003	1,992	199	2,191	91%	9%
2004	3,167	190	3,357	94%	6%
2005	3,463	168	3,631	95%	5%
2006	2,643	169	2,812	94%	6%
2007	2,546	154	2,700	94%	6%
2008	3,099	202	3,301	94%	6%
Average					
1964 to 2008	2,035	213	2,248	91%	9%
10 Year Average					
1999 to 2008	2,330	133	2,463	95%	5%
5 Year Average					
2004 to 2008	2,984	177	3,160	94%	6%

Table 2.–Herring sac roe fishery guideline harvest level (GHL) by section and gear type, harvest by section and gear type, and date sections were closed, KMA, 2008.

Statistical Area	Management Section	Date Closed ^a	Purse Seine		Gillnet	
			GHL	Harvest	GHL	Harvest
<i>NORTH AFOGNAK DISTRICT</i>						
NA10	Shuyak Island	CLOSED	-	-	-	-
NA20	Delphin Bay	CLOSED	-	-	-	-
NA30	Perenosa Bay	6/30/2008	EXPLORATORY	0	EXPLORATORY	0
NA40	Seal Bay	CLOSED	-	-	-	-
NA50	Tonki Bay	5/25/2008	20	21	CLOSED	-
<i>WEST AFOGNAK DISTRICT</i>						
WA10	Raspberry Strait	6/30/2008	CLOSED	-	10	0
WA20	Malina Bay	6/30/2008	CLOSED	-	10	0
WA31	Paramanof Bay	CLOSED	-	-	-	-
WA32	Foul Bay	CLOSED	-	-	-	-
WA40	Blue Fox/Devil's Inlet	6/30/2008	EXPLORATORY	0	EXPLORATORY	0
WA50	Offshore W. Afognak	CLOSED	-	-	-	-
<i>SOUTH AFOGNAK DISTRICT</i>						
SA10	Izhut Bay	6/30/2008	40	0	CLOSED	-
SA20	Kitoi Bay		* Note: SA10, SA20, and SA30 were managed as one section.			
SA30	MacDonalds Lagoon		* Note: SA10, SA20, and SA30 were managed as one section.			
SA40	Danger Bay ^b	4/19/2008	450 ^c	433	150 ^c	-
SA50	Litnik	CLOSED	-	-	-	-
SA60	Duck Bay	CLOSED	-	-	-	-
<i>TOTAL ALL AFOGNAK DISTRICTS</i>			510	454	170	0
<i>UGANIK DISTRICT</i>						
UG10	Kupreanof	CLOSED	-	-	-	-
UG20	Viekoda Bay	6/30/2008	CLOSED	-	25	0
UG21	Terror Bay	6/30/2008	CLOSED	-	30	0
UG30	Village Islands ^d	4/24/2008	1,350	1,629	350	13
UG31	West Uganik Passage	6/30/2008	CLOSED	-	40	0
UG32	NE Arm Uganik Bay		* Note: UG30, UG32, UG33, and UG34 were be managed as one section with 1,350 ton GHL for purse seine gear and 350 ton GHL for gillnet gear.			
UG33	East Arm Uganik Bay					
UG34	South Arm Uganik Bay					
UG40	Offshore Uganik	CLOSED	-	-	-	-
<i>DISTRICT TOTAL</i>			1,350	1,629	445	13
<i>UYAK DISTRICT</i>						
UY10	Offshore Uyak	CLOSED	-	-	-	-
UY20	Harvester Island	CLOSED	-	-	-	-
UY30	Inner Uyak	4/25/2008	200	353	CLOSED	-
UY32	Browns Lagoon	6/30/2008	CLOSED	-	30	0
UY31	Larsen Bay	CLOSED	-	-	-	-
UY40	Zachar Bay	6/30/2008	CLOSED	-	30	0
UY50	Spiridon Bay	6/30/2008	CLOSED	-	10	0
<i>DISTRICT TOTAL</i>			200	353	70	0
<i>ALITAK DISTRICT</i>				353		
AL10	Outer Alitak	CLOSED	-	-	-	-
AL20	Inner Alitak	6/30/2008	100	0	CLOSED	-
AL21	Inner Deadman Bay	5/13/2008	200	207	CLOSED	-
AL22	Outer Deadman Bay		*AL21 and AL22 were managed as one section.			
AL30	Sulua Bay	6/30/2008	CLOSED	-	75	0
AL40	Lower Olga	6/30/2008	CLOSED	-	50	0
AL41	East Upper Olga Bay	5/26/2008	50	90	CLOSED	-
AL50	West Upper Olga Bay	5/26/2008	50	45	CLOSED	-
AL60	Geese/Twoheaded	6/30/2008	EXPLORATORY	0	EXPLORATORY	0
<i>DISTRICT TOTAL</i>			400	342	125	0
<i>STURGEON/HALIBUT DISTRICT</i>						
SH10	Sturgeon/Halibut	CLOSED	CLOSED		CLOSED	

-continued-

Table 2.–Page 2 of 2

Statistical Area	Management Section	Date Closed	Purse Seine		Gillnet	
			GHL	Harvest	GHL	Harvest
EASTSIDE DISTRICT						
EA10	Kaiugnak	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
EA20	SW. Sitkalidak	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
EA21	Three Saints Bay	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
EA22	Newman Bay	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
EA23	W. Sitkalidak Strait	6/30/2008	125	17	CLOSED	-
EA24	Barling Bay	5/5/2008	75	108	CLOSED	-
EA30	E. Sitkalidak Strait	6/30/2008	150	91	CLOSED	-
EA31	Tanginak Anchorage	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
EA40	Outer Sitkalidak	CLOSED	-	-	-	-
EA41	Boulder Bay	CLOSED	-	-	-	-
EA42	Shearwater Bay	6/30/2008	CLOSED	-	40	0
EA43	Outer Kiliuda Bay	6/30/2008	100	29	CLOSED	-
EA44	Inner Kiliuda Bay	6/30/2008	CLOSED	-	40	0
EA50	Outer Ugak Bay	6/30/2008	250	0	CLOSED	-
EA51	Inner Ugak Bay	6/30/2008	CLOSED	-	150	0
EA52	Pasagshak Bay	CLOSED	-	-	-	-
DISTRICT TOTAL			700	245	230	0
NORTHEAST DISTRICT						
NE10	Womens Bay	6/30/2008	CLOSED	-	30	0
NE20	Kalsin Bay	CLOSED	-	-	-	-
NE30	Middle Bay	CLOSED	-	-	-	-
NE40	Inshore Chiniak	CLOSED	-	-	-	-
NE50	Offshore Chiniak	CLOSED	-	-	-	-
DISTRICT TOTAL			CLOSED	-	30	0
INNER MARMOT DISTRICT						
IM10	Monashka Bay	CLOSED	-	-	-	-
IM20	Anton Larsen Bay	CLOSED	-	-	-	-
IM30	Sharatin Bay	CLOSED	-	-	-	-
IM40	Kizhuyak Bay	4/22/2008	60	63	CLOSED	-
IM50	Spruce Island	CLOSED	-	-	-	-
DISTRICT TOTAL			60	63	CLOSED	-
NORTH MAINLAND DISTRICT						
NM10	Hallo Bay	CLOSED	-	-	-	-
NM20	Inner Kukak	EXPLORATORY	EXPLORATORY	-	EXPLORATORY	-
NM30	Outer Kukak	CLOSED	-	-	-	-
NM40	Missak Bay	CLOSED	-	-	-	-
MID MAINLAND DISTRICT						
MM10	Inner Katmai	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
MM20	Outer Katmai	CLOSED	-	-	-	-
MM30	Alinchak	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
MM40	Puale Bay	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
MM50	Portage Bay	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
MM60	Outer Portage	CLOSED	-	-	-	-
SOUTH MAINLAND DISTRICT						
SM10	Wide Bay	EXPLORATORY	EXPLORATORY	0	EXPLORATORY	0
SM20	Lower Shelikof	CLOSED	-	-	-	-
MAINLAND DISTRICTS TOTAL				0		0

GRAND TOTAL	Total GHL All Gear	Total Catch All Gear	Purse Seine		Gillnet	
			GHL	Harvest	GHL	Harvest
			% of GHL	% of Harvest	% of GHL	% of Harvest
	4,290	3,099	3,220	3,086	1,070	13
			95.8%	99.6%	1.2%	0.4%

^a Sections marked 'Closed' did not open during the 2008 sac roe season. Sections marked 'EXPLORATORY' were open to both gear types, with no set GHL.

^b Closed to purse seine fishing on 4/19/2008, gillnet fishing closed 6/30/2008.

^c GHL was initially established at 150 tons for purse seine gear and 50 tons for gillnet gear.

^d Closed to purse seine fishing on 4/24/2008, gillnet fishing closed 6/30/2008.

Table 3.—Summary of season length, guideline harvest level (GHL), harvest by gear type, percentage of harvest by gear type, number of landings, and estimated exvessel earnings for the herring sac roe fishery in the KMA, from 1979 through 2008.

Year	Season Length (Days)	GHL (Tons)	Total Harvest (Tons)	Harvest		Percent Harvest by Gear Type		Number of Landings by Gear Type		Units of Gear Fished		Average Catch by Gear		Estimated Average Earnings ^a		Price per Ton ^a (\$)	Estimated Exvessel Total Value ^a (\$)
				Seine (Tons)	Gillnet (Tons)	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine (Tons)	Gillnet (Tons)	Seine (\$)	Gillnet (\$)		
1979	36	2,400	1,735	1,457	278	84%	16%	-	-	57	125	26	2	\$38,342	\$3,336	\$1,500	\$2,602,500
1980	35	2,400	2,383	2,009	374	84%	16%	-	-	92	109	22	3	\$15,068	\$2,368	\$690	\$1,644,270
1981	48	2,400	2,065	1,596	469	77%	23%	207	406	79	114	20	4	\$14,647	\$2,983	\$725	\$1,497,125
1982	59	2,400	1,771	1,447	324	82%	18%	138	191	45	67	32	5	\$17,686	\$2,660	\$550	\$974,050
1983	51	2,400	2,319	1,797	522	77%	23%	164	284	41	64	44	8	\$35,063	\$6,525	\$800	\$1,855,200
1984	54	2,400	2,163	1,691	472	78%	22%	138	212	39	69	43	7	\$34,687	\$5,472	\$800	\$1,730,400
1985	59	2,000	1,968	1,244	724	63%	37%	118	348	34	81	37	9	\$32,929	\$8,044	\$900	\$1,771,200
1986	61	1,690	1,558	1,110	448	71%	29%	132	385	31	71	36	6	\$34,016	\$5,994	\$950	\$1,480,100
1987	61	1,640	2,146	1,591	554	74%	26%	122	411	29	62	55	9	\$54,862	\$8,935	\$1,000	\$2,146,000
1988	59	2,065	2,171	1,304	867	60%	40%	169	555	33	76	40	11	\$51,370	\$14,830	\$1,300	\$2,822,300
1989	76	2,415	2,249	1,513	736	67%	33%	171	627	37	83	41	9	\$34,758	\$7,537	\$850	\$1,911,650
1990	75	2,375	2,347	1,644	703	70%	30%	156	544	27	63	61	11	\$51,756	\$9,485	\$850	\$1,994,950
1991	83	2,510	2,432	1,697	735	70%	30%	169	587	32	64	53	11	\$45,077	\$9,762	\$850	\$2,067,200
1992	77	2,720	4,283	3,260	1,023	76%	24%	185	706	40	74	82	14	\$40,750	\$6,912	\$500	\$2,141,500
1993	77	3,525	4,929	4,203	726	85%	15%	237	294	41	86	103	8	\$56,382	\$4,643	\$550	\$2,710,950
1994	71	4,550	5,893	4,976	917	84%	16%	285	485	66	57	75	16	\$60,315	\$12,870	\$800	\$4,714,400
1995	73	4,480	4,604	3,837	768	83%	17%	280	642	73	71	53	11	\$66,858	\$13,759	\$1,272	\$5,856,288
1996	69	4,180	3,386	2,322	1,064	69%	31%	202	890	57	74	41	14	\$81,474	\$28,757	\$2,000	\$6,772,000
1997	49	3,435	3,235	2,629	606	81%	19%	183	418	64	59	41	10	\$20,539	\$5,136	\$500	\$1,617,500
1998	50	2,030	2,057	1,954	103	95%	5%	110	26	35	7	56	15	\$27,914	\$7,357	\$500	\$1,028,500
1999	38	1,495	1,651	1,589	62	96%	4%	94	16	31	5	51	12	\$33,984	\$8,221	\$663	\$1,094,613
2000 ^b	37	1,735	1,370	1,290	80	94%	6%	57	23	31	10	42	8	\$29,129	\$5,600	\$700	\$959,000
2001	47	1,540	1,694	1,412	282	83%	17%	67	37	33	9	43	31	\$21,394	\$15,667	\$500	\$847,000
2002	46	1,860	1,677	1,274	403	76%	24%	37	50	30	14	42	29	\$21,233	\$14,393	\$500	\$838,500
2003	42	2,600	1,992	1,738	254	87%	13%	59	45	31	11	56	23	\$28,032	\$11,545	\$500	\$996,000
2004	42	2,850	3,167	2,894	273	91%	9%	95	36	27	11	107	25	\$53,593	\$12,409	\$500	\$1,583,500
2005	31	3,475	3,463	2,932	531	85%	15%	134	61	32	12	92	44	\$45,813	\$22,125	\$500	\$1,731,500
2006	34	3,705	2,643	2,617	26	99%	1%	86	*	21	*	125	*	\$34,270	*	\$275	\$726,825
2007	28	4,000	2,546	2,510	36	99%	1%	105	8	21	3	120	12	\$47,810	\$4,800	\$400	\$1,018,400
2008 ^c	38	4,290	3,099	3,086	13	99.6%	0.4%	108	*	22	*	140	*	\$73,643	*	\$525	\$1,626,975
Average 1979 to 2008	54	2,719	2,633	2,154	479	81%	19%	143	296	41	52	59	13	\$40,113	\$8,898	\$765	\$2,025,347
10 Year 1999 to 2008	38	2,755	2,330	2,134	196	91%	9%	84	28	28	8	82	21	\$38,890	\$10,516	\$506	\$1,142,231
5 Year 2004 to 2008	35	3,664	2,984	2,808	176	95%	5%	106	22	25	6	117	21	\$51,026	\$9,947	\$440	\$1,337,440

^a Exvessel values are based on dock delivered herring and inseason data.

^b Beginning in 2000, an allocative harvest strategy was in effect.

^c Total GHL was initially 3,890 tons, but raised by 400 tons prior to the fishery in the Danger Bay Section.

* Confidential data.

Table 4.–Percent age of herring samples from the commercial sac roe fishery harvest, by section in the KMA, 2008.

Section	Percent at Age													Harvest (tons)
	N	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13+	
Barling Bay	656	0.0	67.2	16.9	3.0	1.8	7.0	1.2	0.6	1.4	0.5	0.0	0.3	108
Danger Bay	925	0.0	16.3	33.4	21.0	6.5	9.6	6.1	4.1	1.6	0.9	0.2	0.2	433
Deadman Bays	457	0.2	26.9	28.0	7.9	6.3	27.7	2.4	0.4	0.0	0.0	0.0	0.0	207
East Sitkalidak Strait	728	0.3	71.8	20.1	1.4	1.5	4.3	0.3	0.3	0.0	0.0	0.0	0.0	91
Inner Uyak Bay	590	0.0	39.8	31.3	14.0	5.6	4.4	2.2	1.2	0.7	0.5	0.0	0.2	353
Kizhuyak	413	0.0	4.4	16.7	11.6	16.2	32.6	9.7	6.1	2.2	0.5	0.0	0.0	63
Kukak	169	1.8	23.0	50.2	21.8	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Paramanoff Bay	473	0.4	59.6	34.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Tonki Bay	471	0.0	22.5	39.0	27.8	6.4	2.8	1.3	0.2	0.0	0.0	0.0	0.0	21
Village Islands	897	0.2	20.2	31.8	20.8	7.1	4.6	5.8	5.1	2.1	1.7	0.0	0.3	1,642
West Upper Olga Bay	322	0.0	6.8	19.5	5.3	9.6	47.5	5.9	2.2	1.2	1.6	0.3	0.0	45
All Samples Combined	6,101	0.1	25.2	30.3	17.5	6.6	8.2	4.9	3.8	1.6	1.2	0.0	0.2	2,963

^a For 'All Samples Combined' the percent of the harvest by section is weighted to the age class data to estimate overall age composition of the harvest.

Table 5.–Average weight of herring samples from the commercial sac roe fishery harvest, by age and section in the KMA, 2008.

Section	N	Average Weight (g)											
		Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13+
Barling Bay	656	-	99	130	167	230	254	277	340	349	407	-	350
Danger Bay	925	-	95	141	187	223	247	267	288	307	309	323	-
Deadman Bays	457	77	107	165	210	270	281	309	373	-	-	-	-
East Sitkalidak Strait	728	73	98	126	158	196	246	247	234	-	-	-	-
Inner Uyak Bay	590	-	93	135	166	178	223	248	250	290	325	-	232
Kizhuyak	413	-	101	158	191	231	264	278	273	317	316	-	-
Kukak	169	49	75	101	116	130	-	-	-	-	-	-	-
Paramanoff Bay	473	38	80	112	142	-	-	-	-	-	-	-	-
Tonki Bay	471	-	89	137	164	196	215	242	206	-	-	-	-
Village Islands	897	73	88	134	177	212	227	256	272	278	306	-	306
West Upper Olga Bay	322	-	113	171	237	272	284	294	309	342	339	359	-

Table 6.–Herring food and bait commercial fishery GHGs by district, KMA, 2008.

Management District	GHG (tons)
F/B 4 - Uganik	179
F/B 5 - Uyak	27
F/B 7 - Alitak	52
F/B 8 - Eastside	93
Total	351

Table 7.–Herring food and bait commercial fishery GHGs and harvest, KMA, 2001-2008.

Year	GHG (tons)	Harvest (tons)
2001	107	114
2002	134	135
2003	197	199
2004	225	190
2005	302	168
2006	342	169
2007	370	154
2008	351	202
Average	254	166

Table 8.—Subsistence herring harvest summary for the KMA, 1991-2008.

Year	Permits	Permits	Estimated Harvest (lbs) by District							
	Issued	Returned	Afognak	Northeast	Inner Marmot	Uganik	Uyak	Eastside	Alitak	Total
1991	50	9	2,110	1,745	1,745	1,000	0	0	0	6,600
1992	45	10	120	250	250	1,000	0	0	320	1,940
1993	50	16	90	3,000	3,910	550	50	0	0	7,600
1994	47	14	90	740	1,350	2,000	200	0	0	4,380
1995	20	6	75	0	500	0	340	0	175	1,090
1996	23	10	550	180	140	0	590	0	0	1,460
1997	16	7	0	200	350	50	1,325	0	0	1,925
1998	18	10	1,240	0	0	50	0	0	0	1,290
1999	15	9	0	200	350	0	425	0	0	975
2000	39	21	575	21,150	0	1,825	0	0	700	24,250
2001	48	19	3,000	0	875	0	1,015	10,500	0	15,390
2002	^a	23	1,170	1,150	420	0	200	903	0	3,843
2003	^a	16	0	220	300	0	420	1,210	30	2,180
2004	^a	22	200	780	450	206	1,570	942	0	4,148
2005	^a	37	300	995	920	160	550	2,255	155	5,335
2006	^a	30	200	1,170	1,040	250	265	1,610	0	4,535
2007	^a	36	240	872	1,150	5	1,470	850	300	4,887
2008	^a	21	0	1,194	1,150	50	1,020	610	0	4,024

^a Beginning in 2002 herring was added to the Kodiak subsistence salmon and crab permit; no separate permit was required.

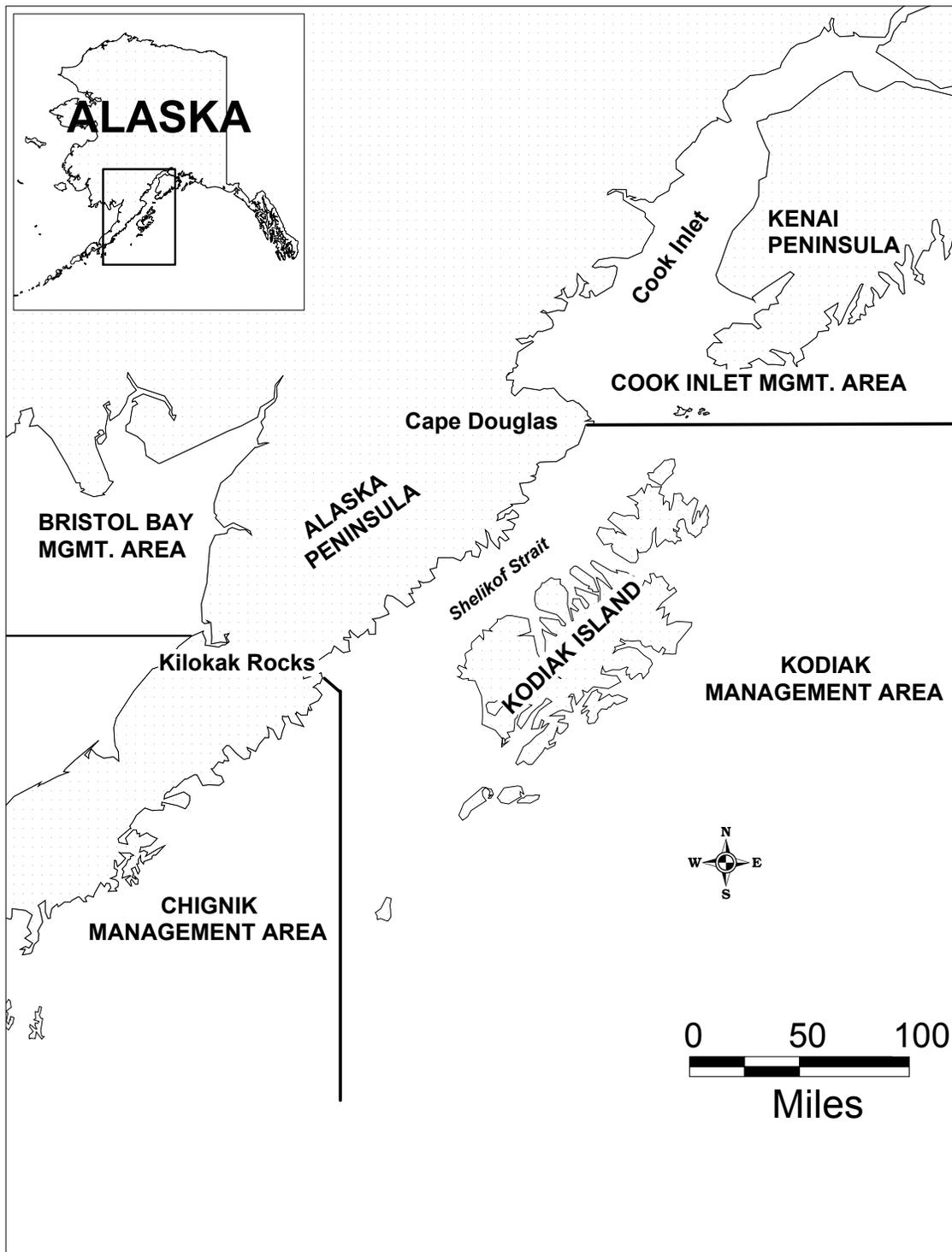


Figure 1.—Map of southwestern Alaska showing the KMA and surrounding management areas.

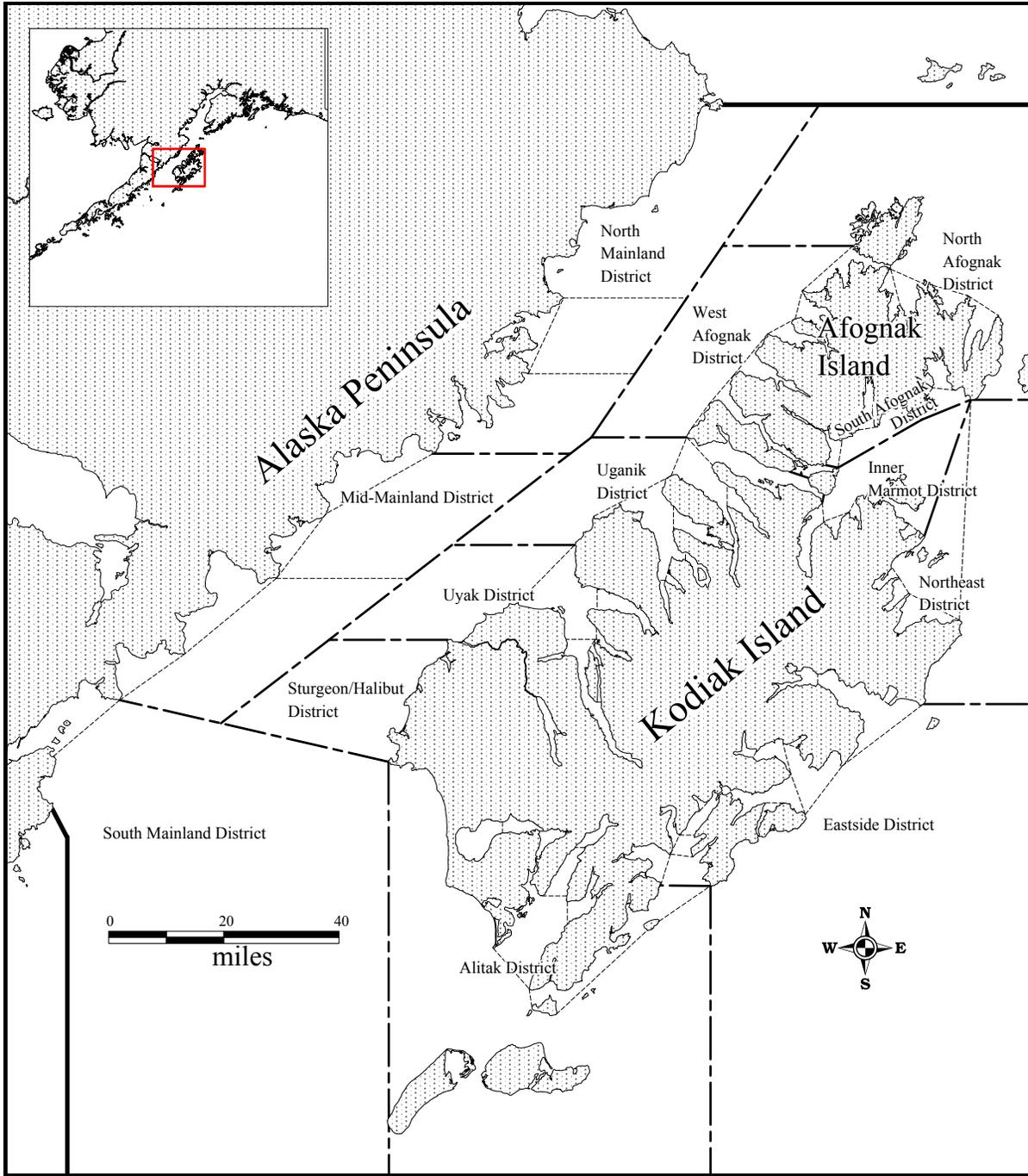


Figure 2.—Map of the Kodiak Management Area illustrating the herring commercial fishery districts.

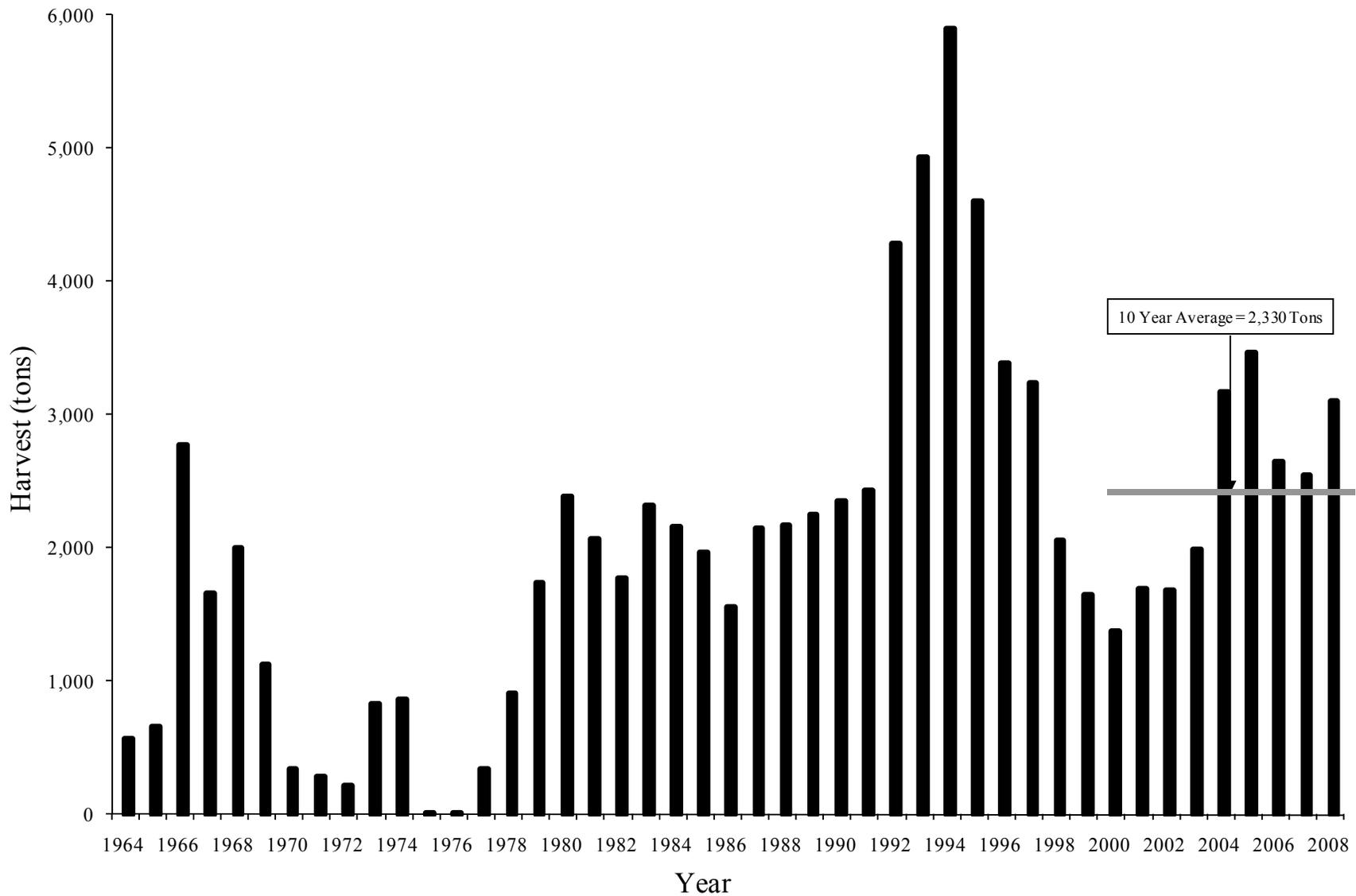


Figure 3.—Herring sac roe commercial fishery harvest in the KMA, 1964 through 2008.

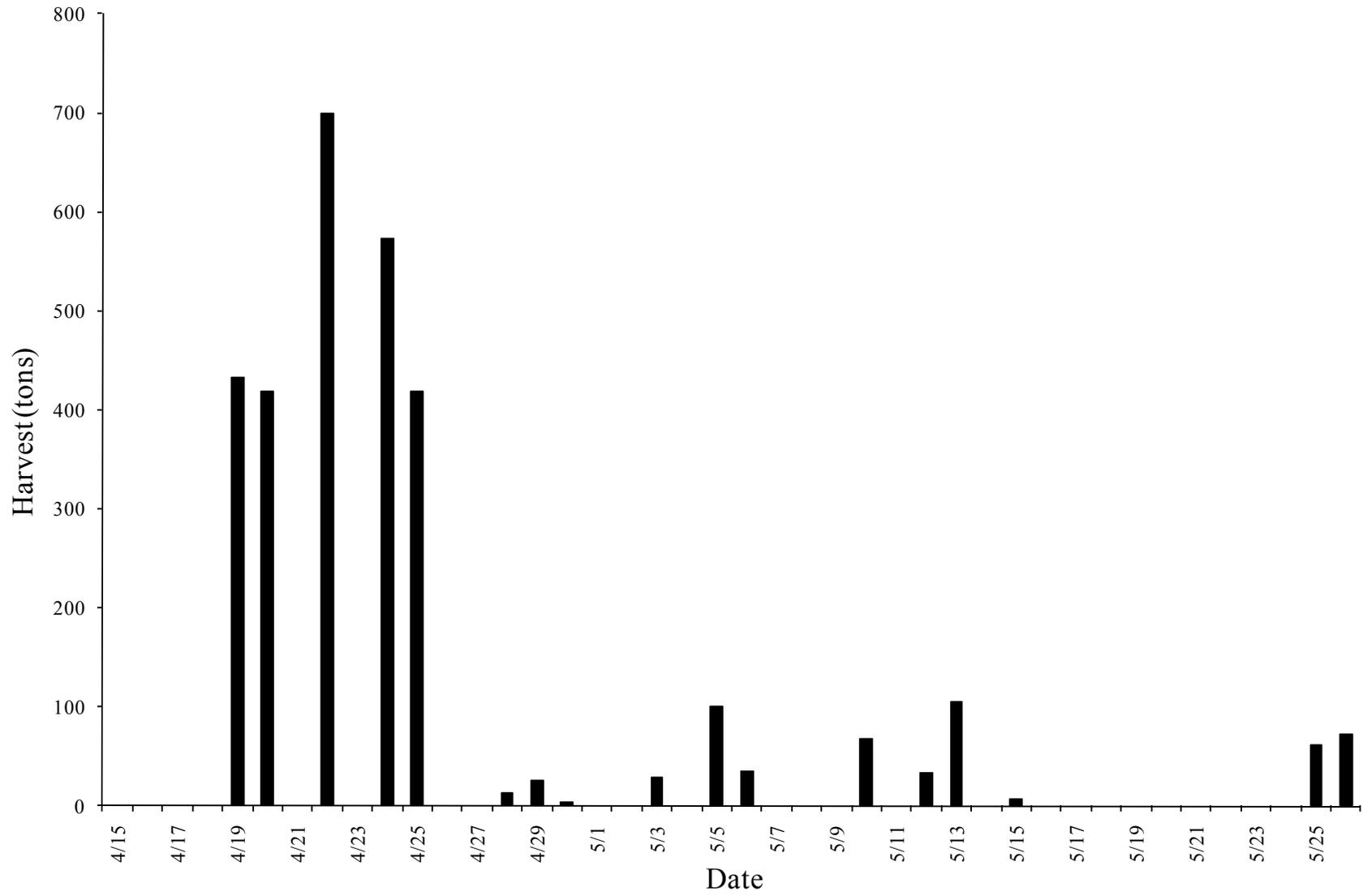


Figure 4.—Herring sac roe fishery harvest by day in the KMA, 2008.

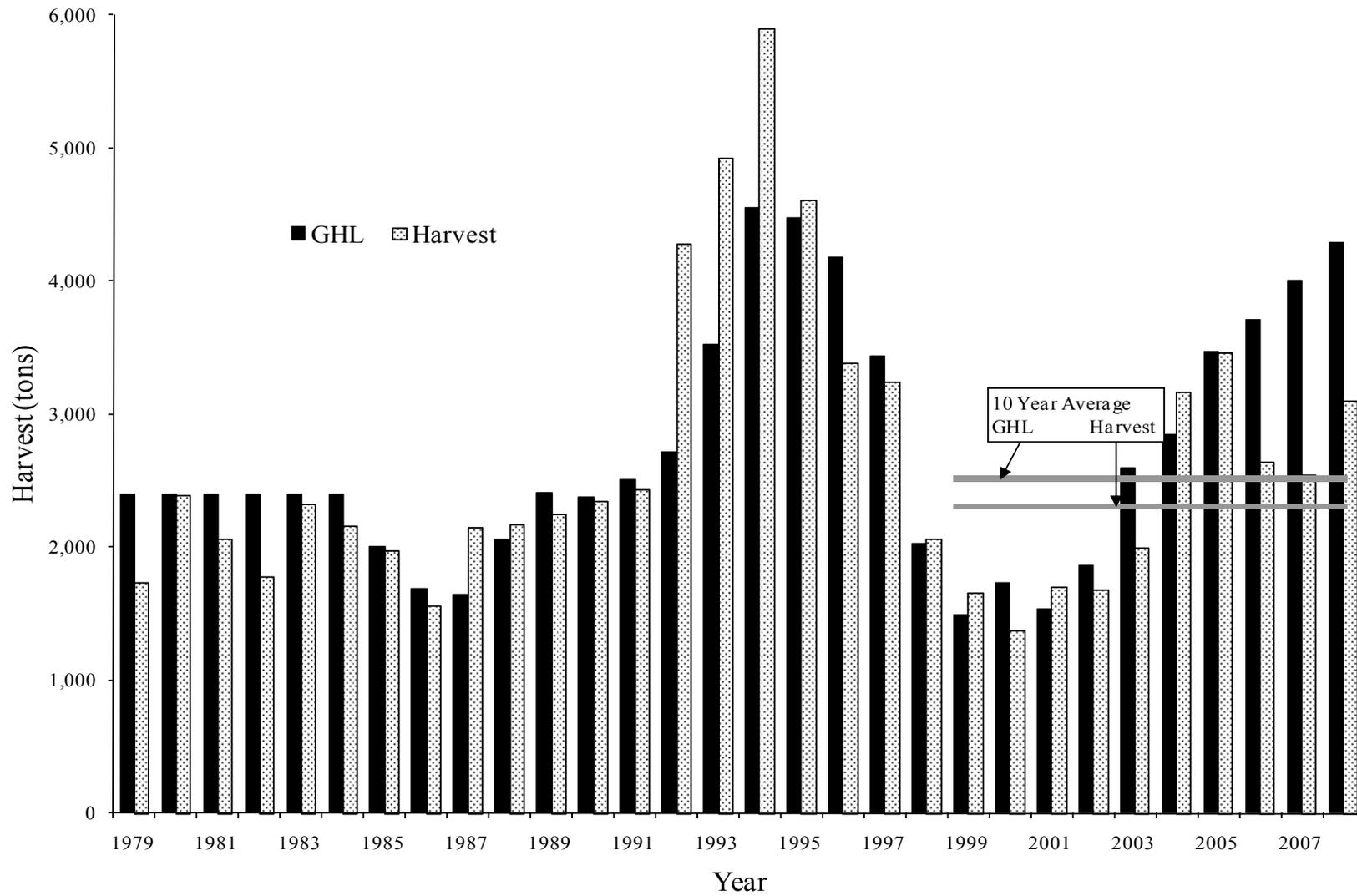
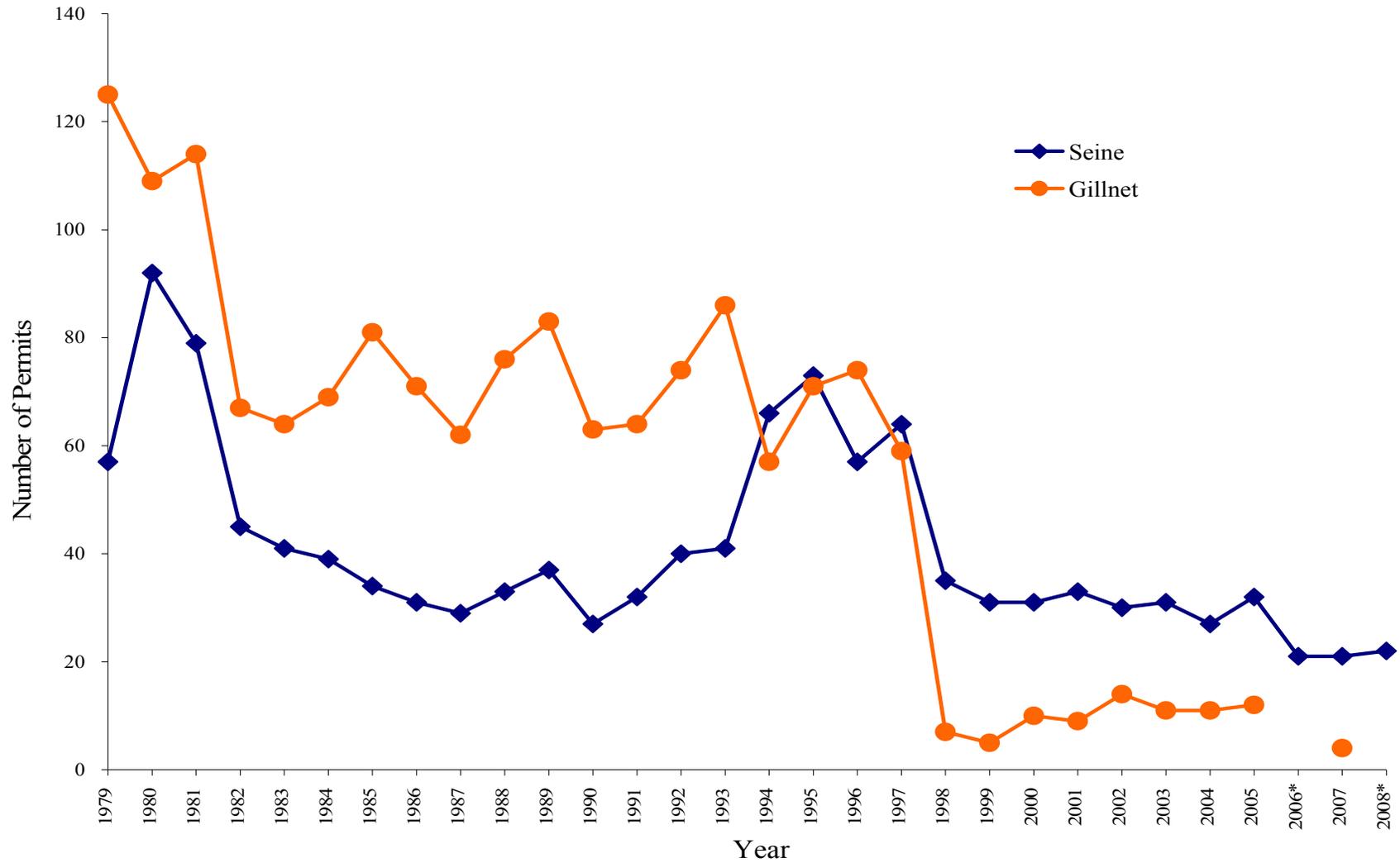


Figure 5.—Comparison of guideline harvest levels (GHLs) to the herring sac roe commercial harvest, KMA, 1979 through 2008.



* 2006 and 2008 gillnet data is confidential

Figure 6.—Herring sac roe commercial fishery participation, by gear type in the KMA, 1979 through 2008.

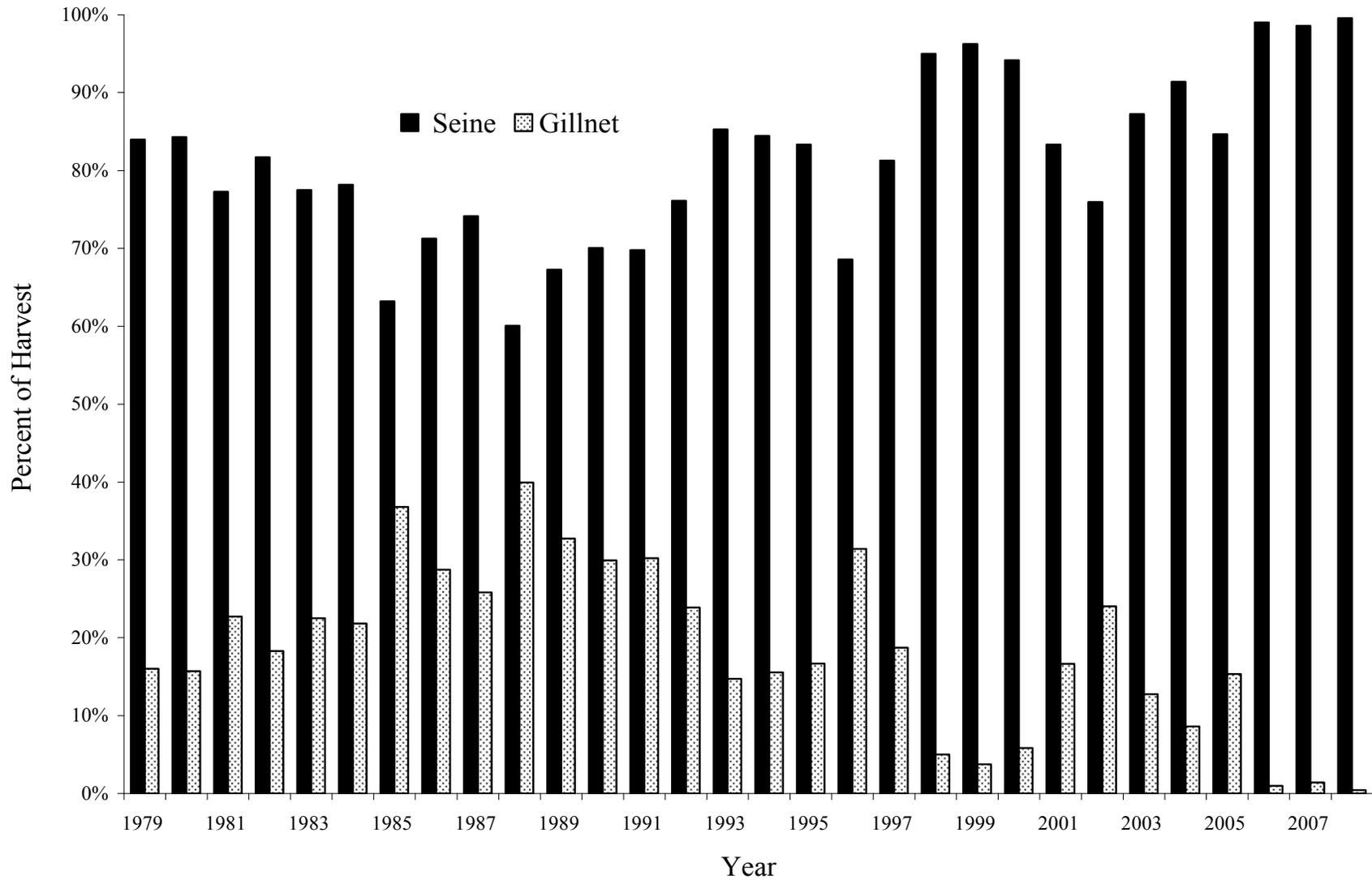


Figure 7.—Percent of the total harvest by gear type in herring sac roe commercial fishery, KMA, 1979 through 2008.

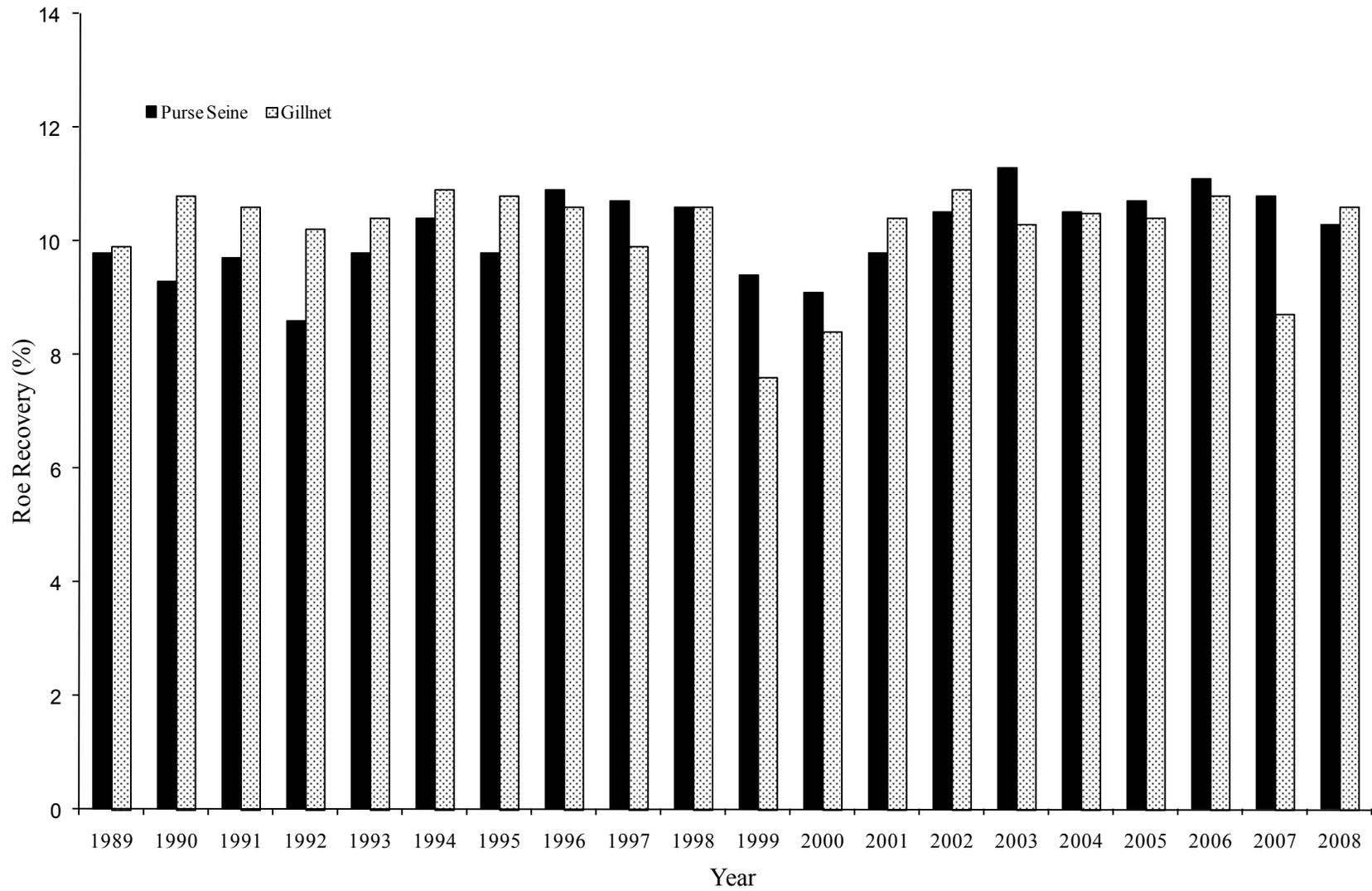
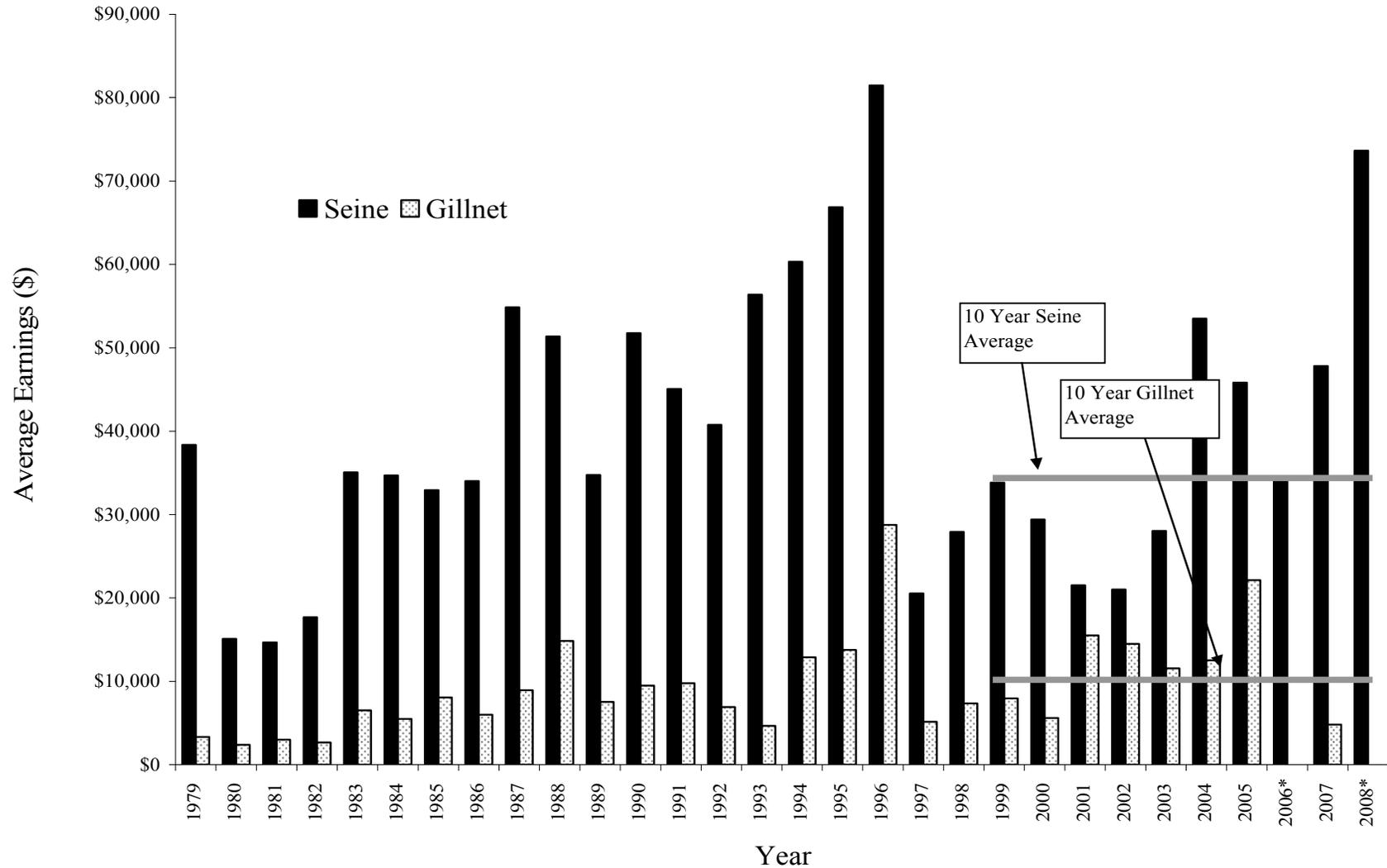


Figure 8.—Roe recovery for the herring sac roe commercial fishery, KMA, 1989 through 2008.



* 2006 and 2008 gillnet data is confidential

Figure 9.—Average earnings by gear type for herring sac roe commercial fisheries, KMA, 1979 through 2008.

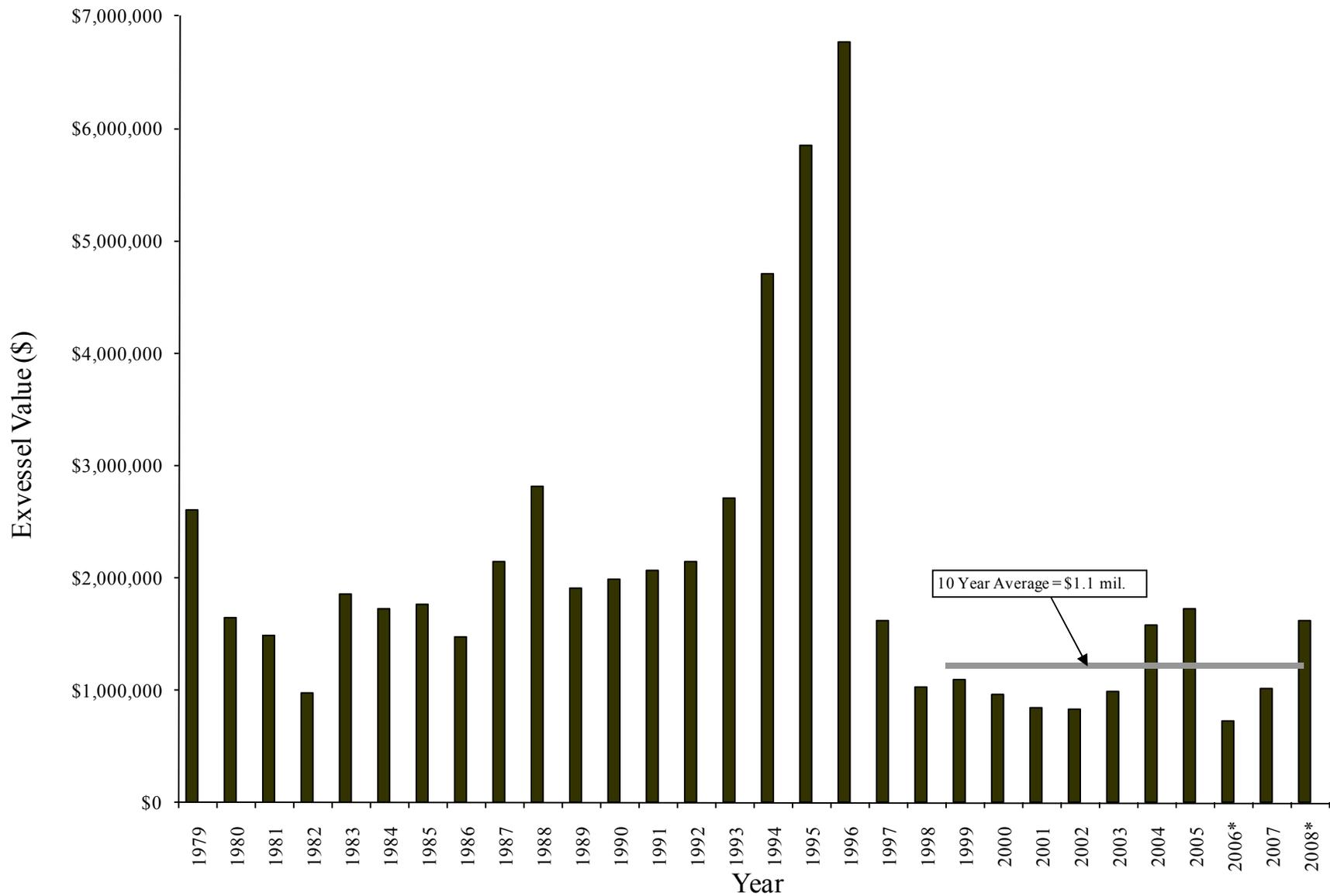


Figure 10.—Total exvessel value for herring sac roe commercial fisheries, KMA, 1979 through 2008.

**APPENDIX A: SUMMARY OF EMERGENCY ORDERS
ISSUED FOR THE HERRING COMMERCIAL FISHERIES
IN THE KODIAK MANAGEMENT AREA, 2008**

Appendix A.–Summary of emergency orders issued for the herring commercial fisheries in the Kodiak Management Area, 2008.

Emergency Order #	Issued	Effective:	Action Taken:
1	2:30 PM April 9	noon April 15	<u>Open Sac Roe Fishery</u> : initial opening times and fishing periods by gear and section for sac roe herring fishery announced.
2	9:00 PM April 19	1:00 PM April 19	<u>Fishing Period</u> : commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear south of south of 58° 11.20' N. lat. and north of 58° 09.50' N. lat. from 1:00 PM to 1:10 PM April 19. This EO also increased the GHF in the Danger Bay section to 450 tons for purse seine gear and 150 tons for gillnet gear.
3	9:00 PM April 19	3:45 PM April 19	<u>Fishing Period</u> : commercial herring fishing opened in the Danger Bay Section (SA40) for purse seine gear south of south of 58° 11.20' N. lat. from 3:45 PM to 7:00 PM April 19.
4	9:00 PM April 19	9:00 AM April 20	<u>Fishing Period</u> : commercial herring fishing opened in the Danger Bay Section (SA40) for gillnet gear from 9:00 AM April 20 to 9:00 AM April 21.
5	11:00 AM April 20	9:00 AM April 21	<u>Fishing Period</u> : commercial herring fishing opened in the Danger Bay Section (SA40) for gillnet gear from 9:00 AM April 21 until further notice.
6	2:00 PM April 20	11:15 AM April 20	<u>Fishing Period</u> : commercial herring fishing opened in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 11:15 AM to 12:15 PM April 20 in that portion south of 57°48.00' N. lat. and north of 57°46.00' N. lat.
7	2:00 PM April 20	12:15 PM April 20	<u>Extension</u> : commercial herring fishing was extended in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 12:15 PM to 2:15 PM April 20 in that portion south of 57°48.00' N. lat. and north of 57°45.00' N. lat.

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Emergency Order #	Issued:	Effective:	Action Taken:
8	2:00 PM April 20	2:15 PM April 20	<u>Extension:</u> commercial herring fishing was extended in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 2:15 PM to 3:15 PM April 20 in that portion south of 57°48.00' N. lat. and north of 57°45.00' N. lat.
9	4:00 PM April 20	3:15 PM April 20	<u>Extension:</u> commercial herring fishing was extended in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 3:15 PM to 7:15 PM April 20 in that portion south of 57°48.00' N. lat. and north of 57°45.00' N. lat.
10	7:00 PM April 20	9:00 PM April 20	<u>Extension:</u> commercial herring fishing was extended in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 7:15 PM to 9:00 PM April 20 in that portion south of 57°48.00' N. lat. and north of 57°45.00' N. lat.
11	2:30 AM April 22	11:30 AM April 22	<u>Closure:</u> the Kizhuyak Bay Section (IM40) at 11:30 AM April 22.
12	7:30 PM April 22	4:20 PM April 22	<u>Fishing period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 4:20 PM to 5:20 PM April 22 in that portion south of 57°46.00' N. lat. and north of 57°44.00' N. lat.
13	7:30 PM April 22	5:20 PM April 22	<u>Extension:</u> commercial herring fishing was extended in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 5:20 PM to 6:20 PM April 22 in that portion south of 57°46.00' N. lat. and north of 57°44.00' N. lat.
14	9:45 AM April 23	10:00 AM April 23	<u>Fishing Period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay sections (UG30, 32-34) for gillnet gear from 10:00 AM April 23 to 10:00 AM April 24.
15	9:45 AM April 23	9:00 AM April 24	<u>Fishing Period:</u> commercial herring fishing opened for purse seine gear in the Outer Ugak Bay Section (EA50) from 9:00 AM to noon on even numbered days and from noon to 9:00 PM on odd numbered days beginning at 9:00 AM April 24.

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Emergency Order #	Issued:	Effective:	Action Taken:
16	6:30 PM April 24	5:05 PM April 24	<u>Fishing period:</u> commercial herring fishing opened in the Village Islands/Uganik Bay sections (UG30, 32-34) for purse seine gear from 5:05 PM to 5:25 PM April 24 in that portion east of 153° 32.60 W. long., south of 57°47.60' N. lat., and north of 57°46.50' N. lat
17	9:00 AM April 26	12:50 PM April 25	<u>Fishing Period:</u> commercial herring fishing opened for purse seine gear in the Inner Uyak Bay Section (UY30) from 12:50 PM to 3:00 PM April 25.
18	9:00 AM April 26	3:00 PM April 25	<u>Extension:</u> commercial herring fishing was extended in the Inner Uyak Bay Section (UY30) until 5:00 PM April 25.
19	9:00 AM April 26	5:00 PM April 25	<u>Extension:</u> commercial herring fishing was extended in the Inner Uyak Bay Section (UY30) until 9:00 PM April 25.
20	9:00 AM April 26	7:25 PM April 25	<u>Closure:</u> the Inner Uyak Bay Section (UY30) at 7:25 PM April 25.
21	2:45 PM May 5	2:45 PM May 5	<u>Closure:</u> the Tonki Bay Section (NA50) at 2:45 PM May 5.
22	6:45 PM May 5	5:50 PM May 5	<u>Closure:</u> The Barling Bay Section (EA24) at 5:50 PM May 5.
23	4:30 PM May 8	9:00 AM May 10	<u>Fishing Period:</u> This EO opened the Sulua Bay Section (AL30) and the Lower Olga Bay Section (AL40) to purse seine gear from 9:00 AM to noon on even numbered days and from noon to 10:00 PM on odd numbered days beginning May 10. <u>Fishing Period:</u> this EO also established fishing periods for gillnet gear in the Sulua Bay (AL30) and Lower Olga Bay (AL40) sections from noon on even numbered days until noon on odd numbered days beginning May 10.

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Emergency Order #	Issued:	Effective:	Action Taken:
24	8:30 PM May 14	10:00 PM May 13	<u>Closure:</u> the combined Inner Deadman Bay (AL21) and Outer Deadman Bay (AL22) sections at 10:00 PM May 13
25	12:45 PM May 26	11:00 AM May 26	<u>Closure:</u> the East Upper Olga Bay (AL41) and the West Upper Olga Bay (AL50) sections at 11:00 AM May 26.
26	3:00 PM September 18	3:00 PM September 18	<u>F/B Fishing Period:</u> this EO established the initial fishing period and GHLs for the food/bait fishery. The Uganik District, south of the latitude of Miner's Point opened with a 179 ton GHL.

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